FIG. 1

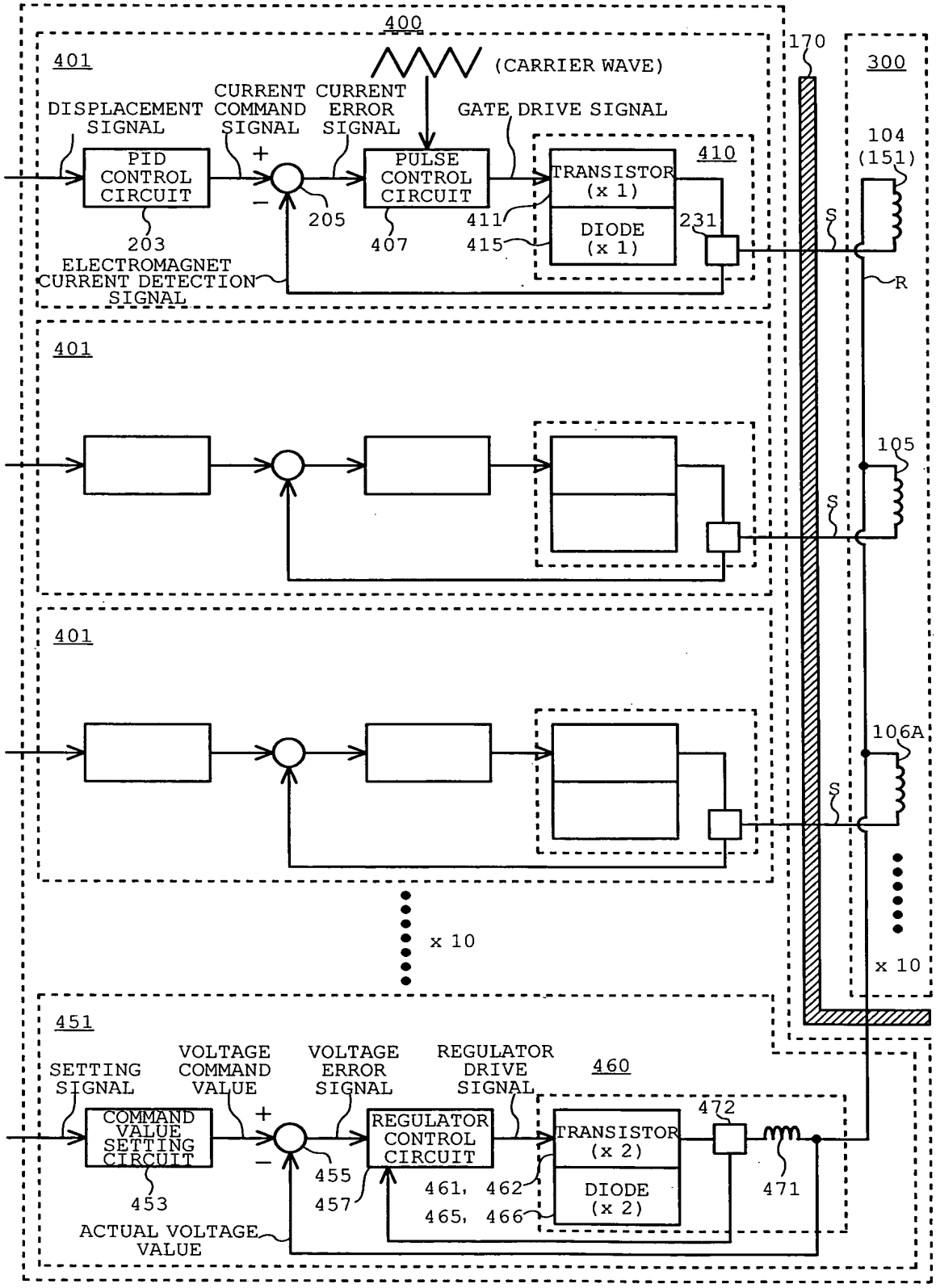

400
401
(CARRIER WAVE)
DISPLACEMENT SIGNAL
CURRENT COMMAND SIGNAL
CURRENT ERROR SIGNAL
GATE DRIVE SIGNAL
PID CONTROL CIRCUIT
PULSE CONTROL CIRCUIT
TRANSISTOR (x 1)
DIODE (x 1)
410
203
205
407
411
415
231
ELECTROMAGNET CURRENT DETECTION SIGNAL
170
300
104 (151)
105
106A
S
R
x 10
451
SETTING SIGNAL
VOLTAGE COMMAND VALUE
VOLTAGE ERROR SIGNAL
REGULATOR DRIVE SIGNAL
460
COMMAND VALUE SETTING CIRCUIT
REGULATOR CONTROL CIRCUIT
TRANSISTOR (x 2)
DIODE (x 2)
453
455
457
461, 462
465, 466
472
471
ACTUAL VOLTAGE VALUE

FIG. 2

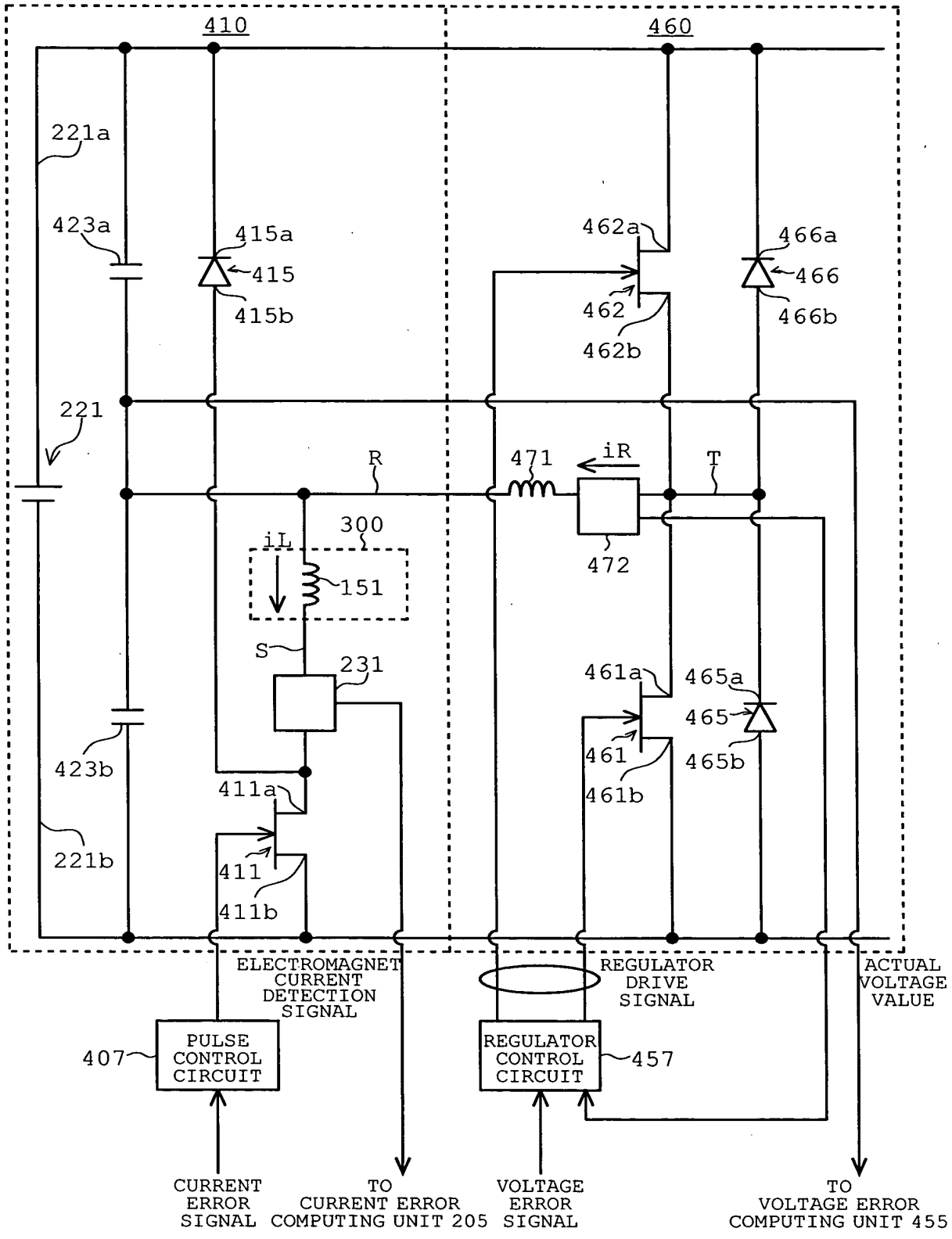

410
460
221a
423a
415a
415
415b
462a
462
462b
466a
466
466b
221
R
471
iR
T
300
iL
151
472
S
231
461a
465a
465
461
461b
465b
423b
411a
221b
411
411b
ELECTROMAGNET CURRENT DETECTION SIGNAL
REGULATOR DRIVE SIGNAL
ACTUAL VOLTAGE VALUE
407
PULSE CONTROL CIRCUIT
REGULATOR CONTROL CIRCUIT
457
CURRENT ERROR SIGNAL
TO CURRENT ERROR COMPUTING UNIT 205
VOLTAGE ERROR SIGNAL
TO VOLTAGE ERROR COMPUTING UNIT 455

FIG. 3

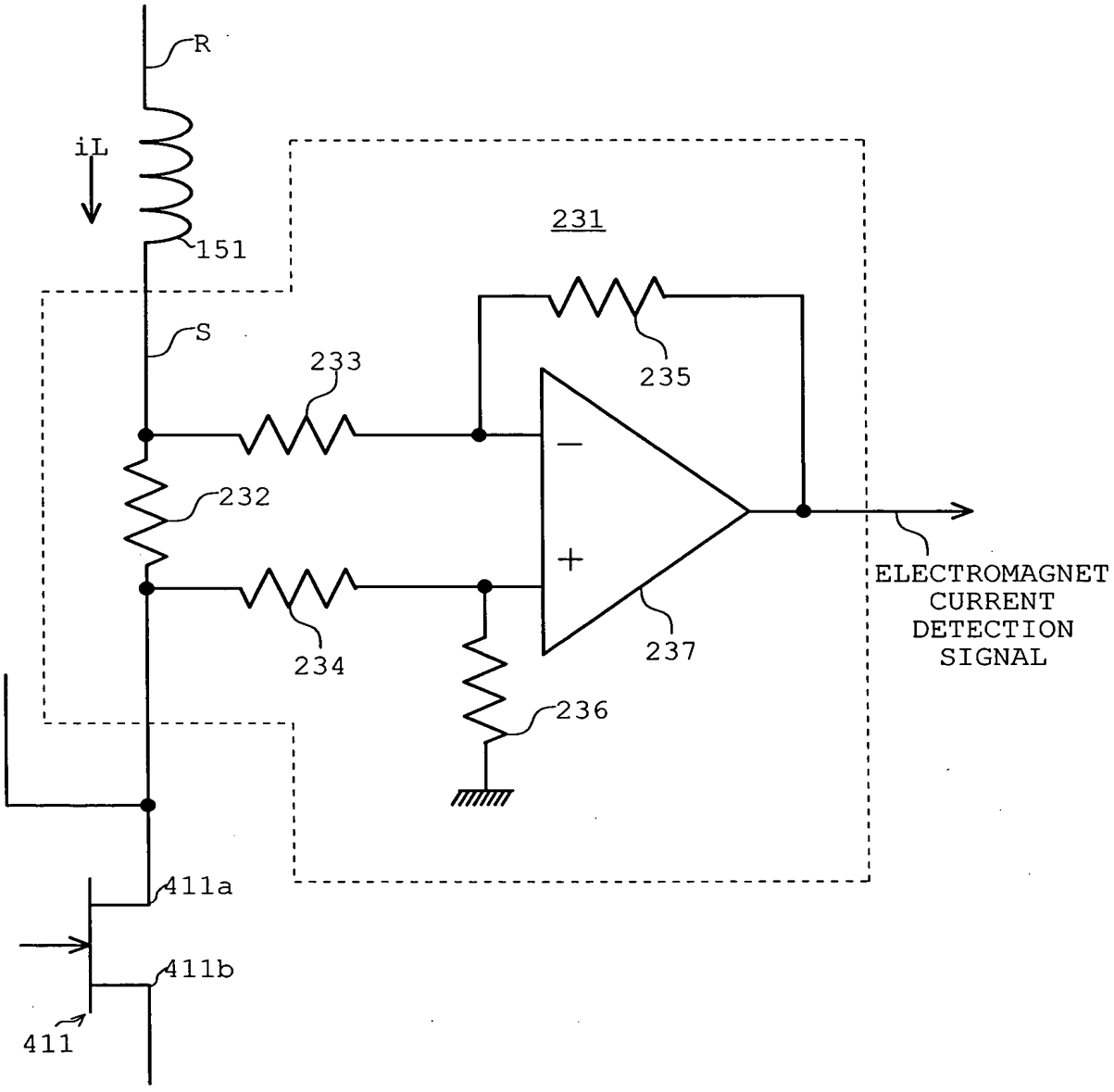

R
iL
151
231
S
233
235
232
234
236
237
ELECTROMAGNET
CURRENT
DETECTION
SIGNAL
411a
411b
411

FIG. 4

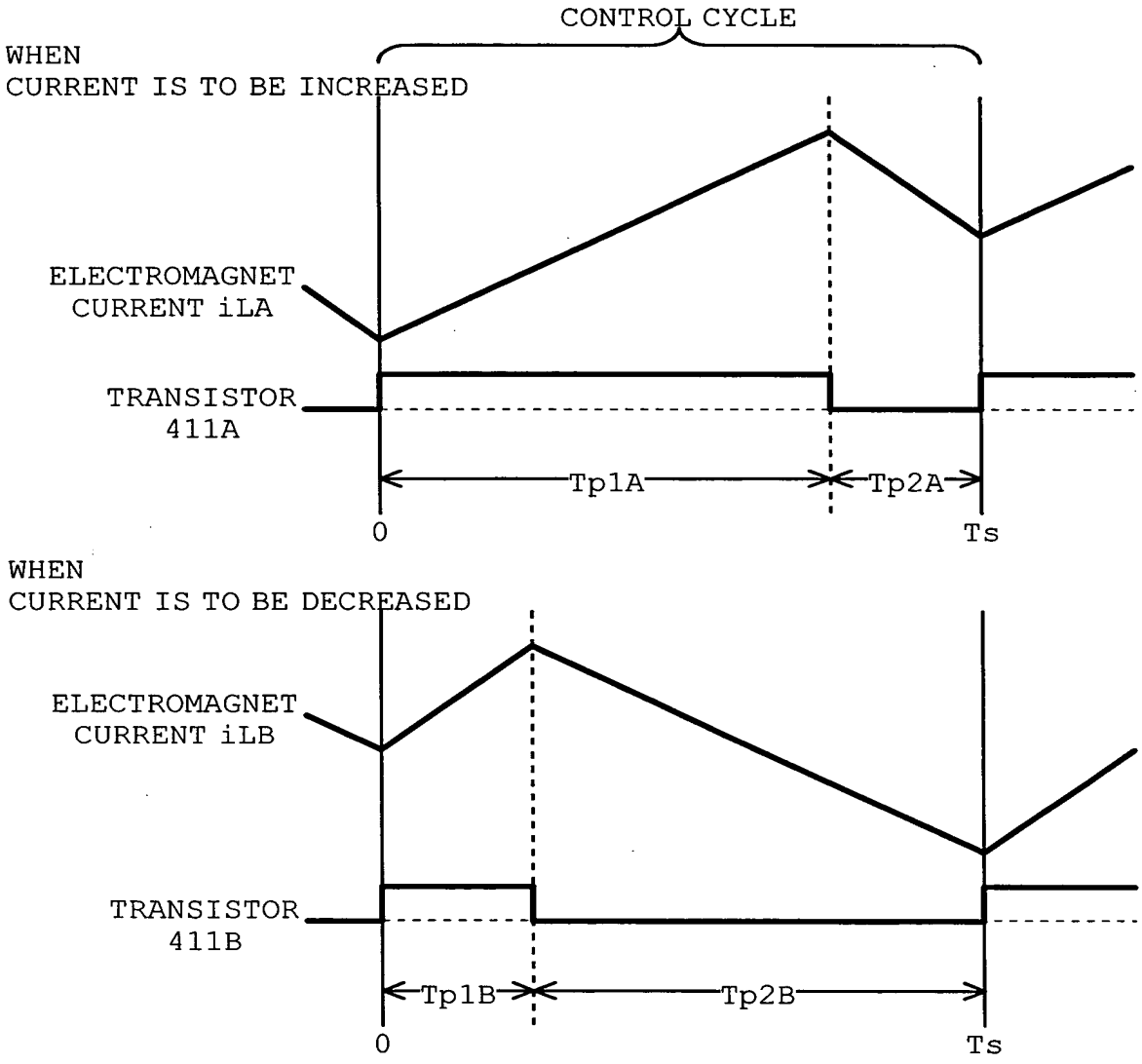
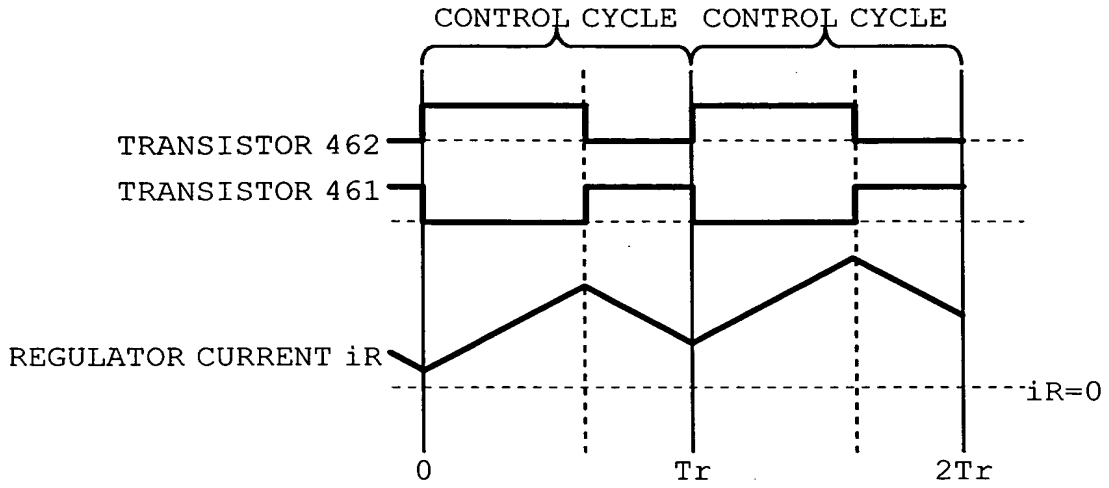

CONTROL CYCLE
WHEN
CURRENT IS TO BE INCREASED
ELECTROMAGNET
CURRENT iLA
TRANSISTOR
411A
Tp1A
Tp2A
0
Ts
WHEN
CURRENT IS TO BE DECREASED
ELECTROMAGNET
CURRENT iLB
TRANSISTOR
411B
Tp1B
Tp2B
0
Ts

FIG. 5

WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS CONSIDERABLY
LOWER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR LARGE



WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS SLIGHTLY
LOWER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR SMALL

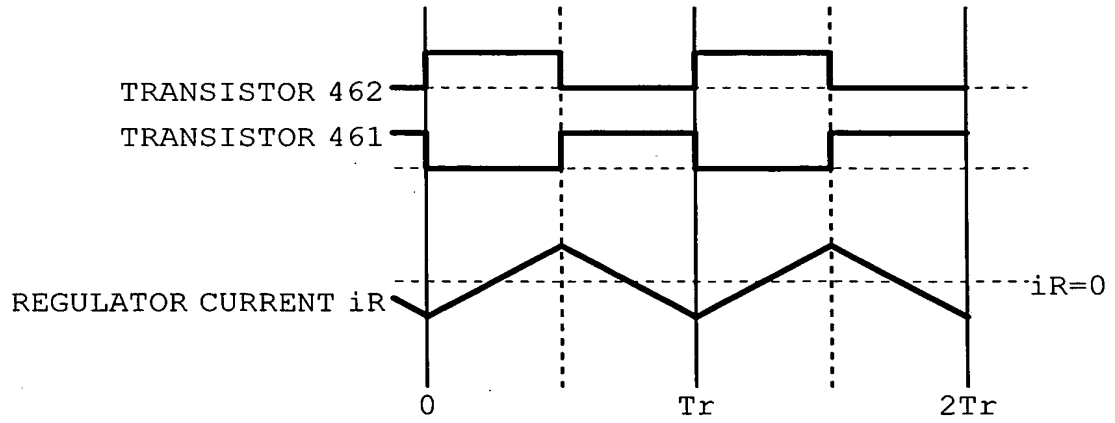


FIG. 6

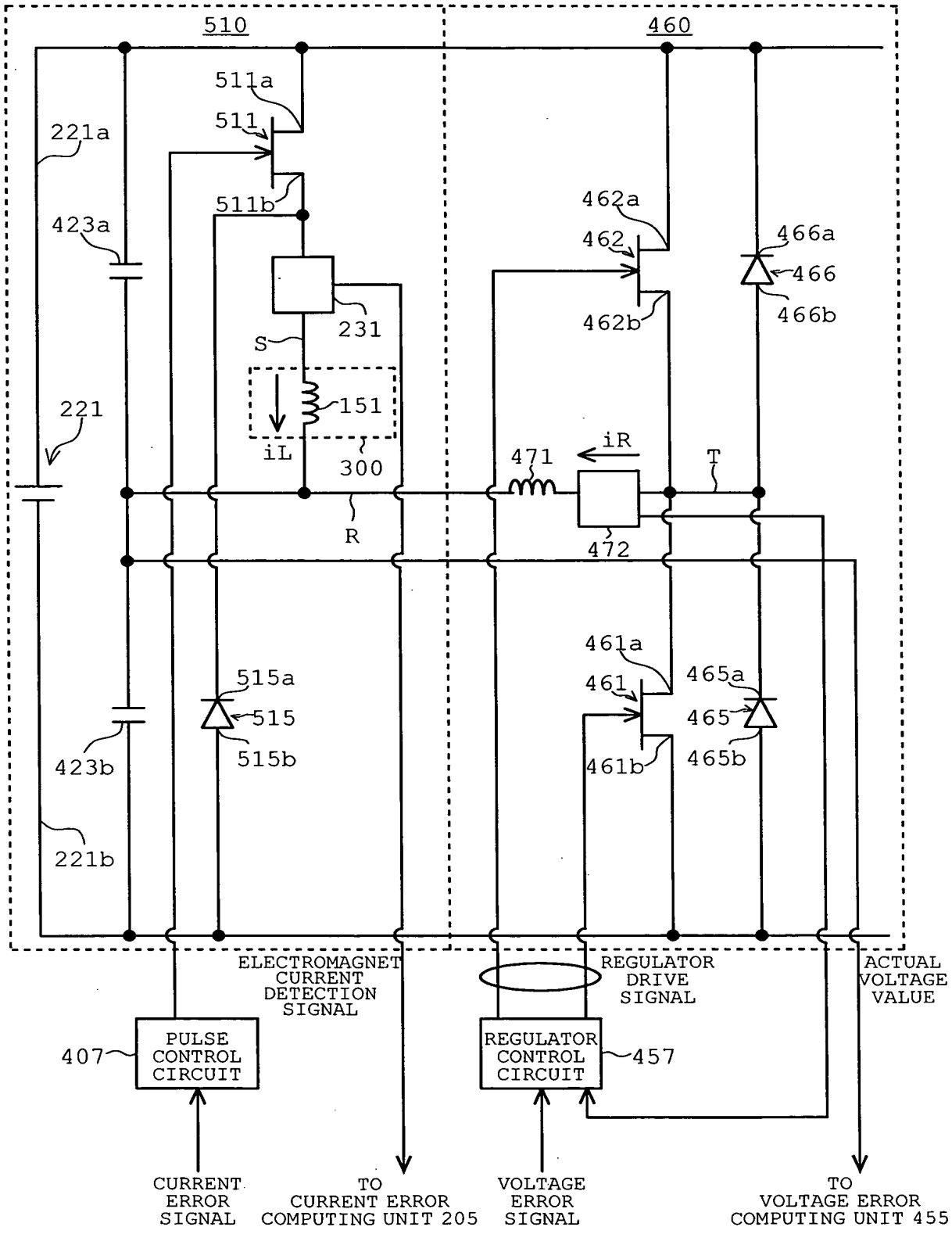
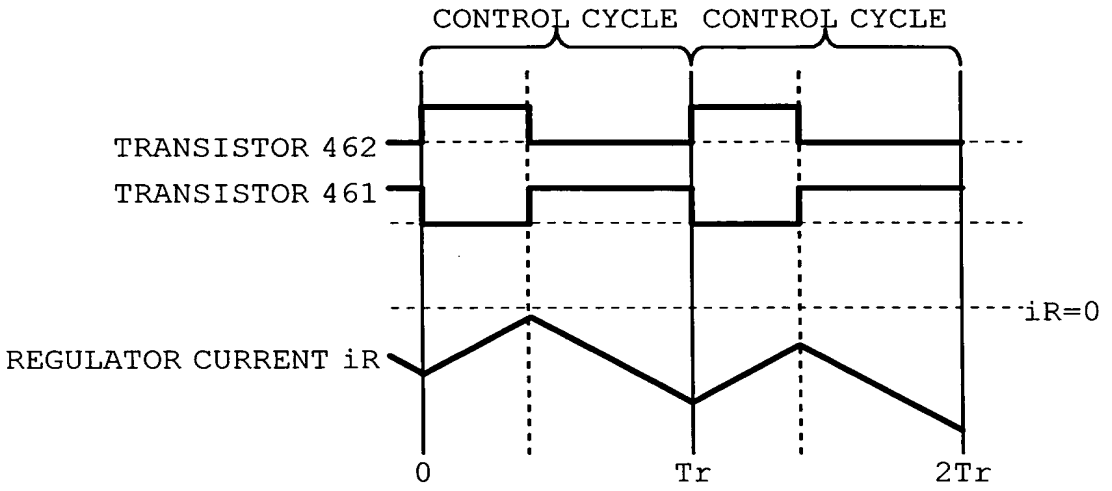

510
460
511a
511
221a
511b
462a
462
466a
466
423a
231
462b
466b
S
151
221
iL
300
iR
471
T
R
472
461a
515a
465a
461
515
465
423b
461b
515b
465b
221b
ELECTROMAGNET CURRENT DETECTION SIGNAL
REGULATOR DRIVE SIGNAL
ACTUAL VOLTAGE VALUE
PULSE CONTROL CIRCUIT
407
REGULATOR CONTROL CIRCUIT
457
CURRENT ERROR SIGNAL
TO CURRENT ERROR COMPUTING UNIT 205
VOLTAGE ERROR SIGNAL
TO VOLTAGE ERROR COMPUTING UNIT 455

FIG. 7

WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS CONSIDERABLY
HIGHER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR LARGE



WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS SLIGHTLY
HIGHER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR SMALL

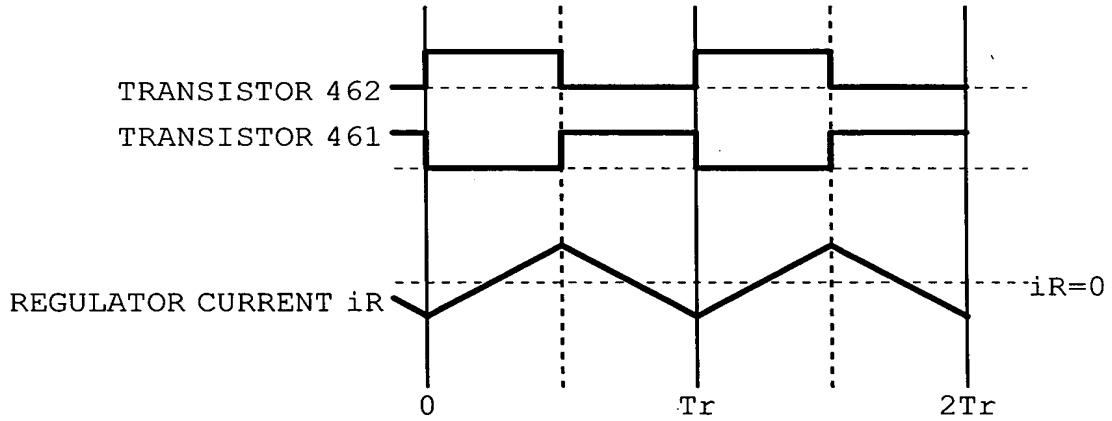


FIG. 8

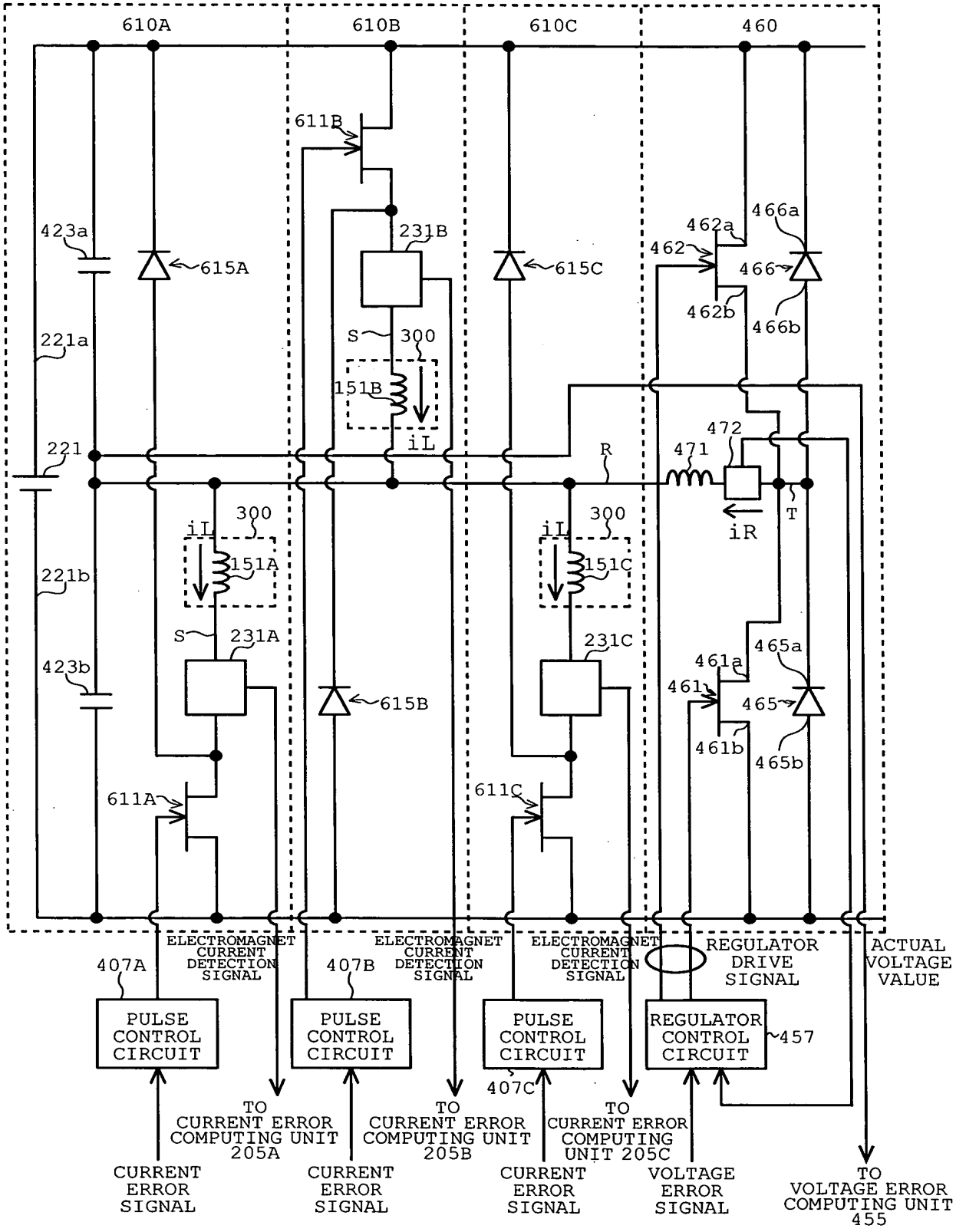

610A
610B
610C
460
611B
231B
423a
615A
615C
462a
466a
462
466
462b
466b
221a
S
300
151B
iL
221
472
471
R
T
iR
iL
300
151A
151C
221b
S
231A
231C
423b
615B
465a
461a
461
465
461b
465b
611A
611C
ELECTROMAGNET CURRENT DETECTION SIGNAL
ELECTROMAGNET CURRENT DETECTION SIGNAL
ELECTROMAGNET CURRENT DETECTION SIGNAL
REGULATOR DRIVE SIGNAL
ACTUAL VOLTAGE VALUE
407A
407B
407C
PULSE CONTROL CIRCUIT
PULSE CONTROL CIRCUIT
PULSE CONTROL CIRCUIT
REGULATOR CONTROL CIRCUIT
457
TO CURRENT ERROR COMPUTING UNIT 205A
TO CURRENT ERROR COMPUTING UNIT 205B
TO CURRENT ERROR COMPUTING UNIT 205C
CURRENT ERROR SIGNAL
CURRENT ERROR SIGNAL
CURRENT ERROR SIGNAL
VOLTAGE ERROR SIGNAL
TO VOLTAGE ERROR COMPUTING UNIT 455

FIG. 9

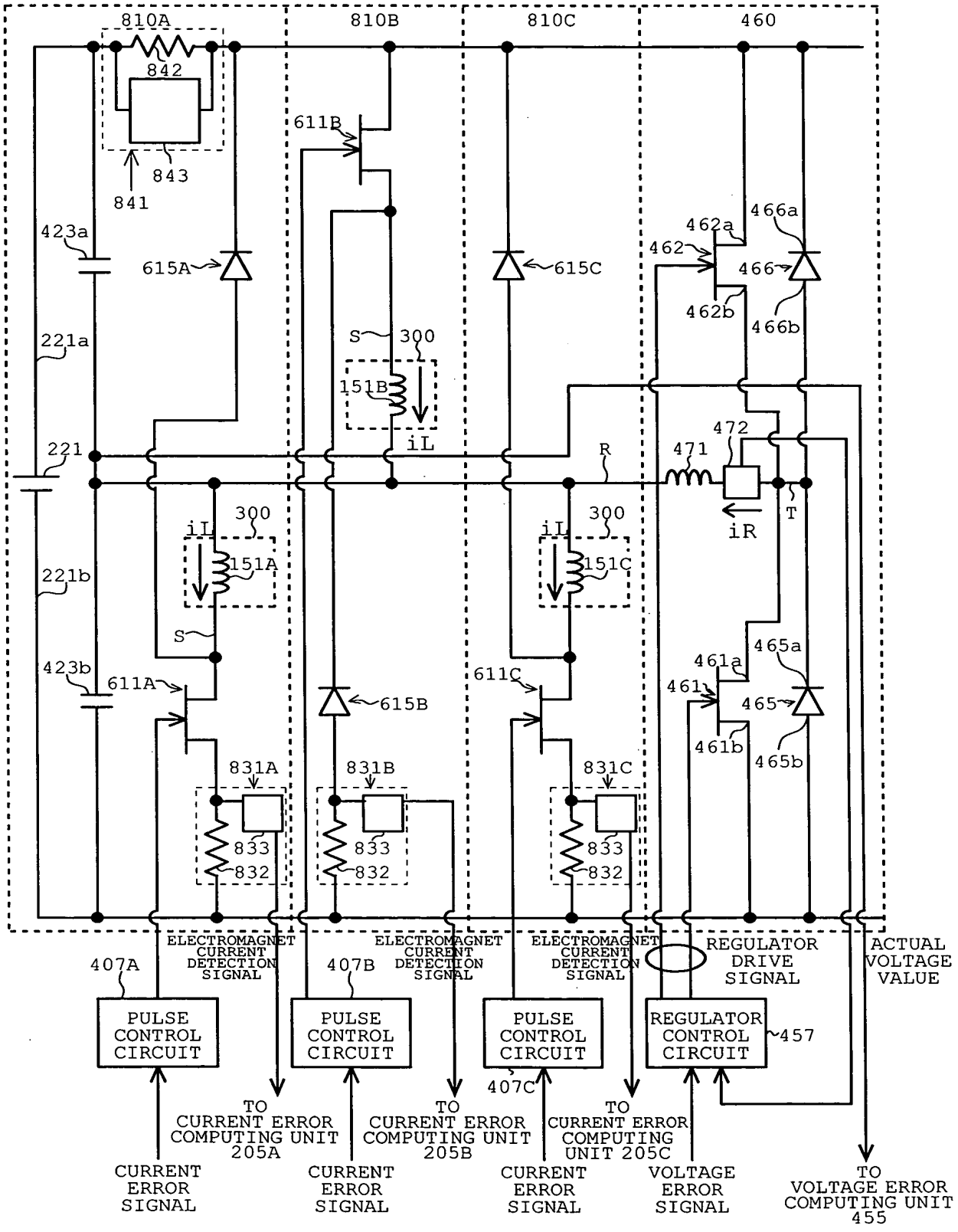

810A
810B
810C
460
842
843
841
611B
423a
615A
615C
462a
462
466a
466
462b
466b
221a
S
300
151B
iL
221
R
472
471
T
iR
300
iL
151A
300
iL
151C
221b
S
423b
611A
615B
611C
461a
461
465a
465
461b
465b
831A
831B
831C
833
832
ELECTROMAGNET CURRENT DETECTION SIGNAL
ELECTROMAGNET CURRENT DETECTION SIGNAL
ELECTROMAGNET CURRENT DETECTION SIGNAL
REGULATOR DRIVE SIGNAL
ACTUAL VOLTAGE VALUE
407A
407B
407C
PULSE CONTROL CIRCUIT
PULSE CONTROL CIRCUIT
PULSE CONTROL CIRCUIT
REGULATOR CONTROL CIRCUIT
457
TO CURRENT ERROR COMPUTING UNIT 205A
TO CURRENT ERROR COMPUTING UNIT 205B
TO CURRENT ERROR COMPUTING UNIT 205C
CURRENT ERROR SIGNAL
CURRENT ERROR SIGNAL
CURRENT ERROR SIGNAL
VOLTAGE ERROR SIGNAL
TO VOLTAGE ERROR COMPUTING UNIT 455

FIG. 10

AMPLIFIER CIRCUIT STRUCTURE	ELECTROMAGNET CURRENT iL WHEN TRANSISTOR IS TURNED ON	ELECTROMAGNET CURRENT iL WHEN TRANSISTOR IS TURNED OFF	CURRENT DETECTION TIMING
AMPLIFIER CIRCUIT 810A AMPLIFIER CIRCUIT 810C	FROM COMMON NODE TO NEGATIVE ELECTRODE	FROM COMMON NODE TO POSITIVE ELECTRODE	UPON TURNING TRANSISTOR ON
AMPLIFIER CIRCUIT 810B	FROM POSITIVE ELECTRODE TO COMMON NODE	FROM NEGATIVE ELECTRODE TO COMMON NODE	UPON TURNING TRANSISTOR OFF

FIG. 11

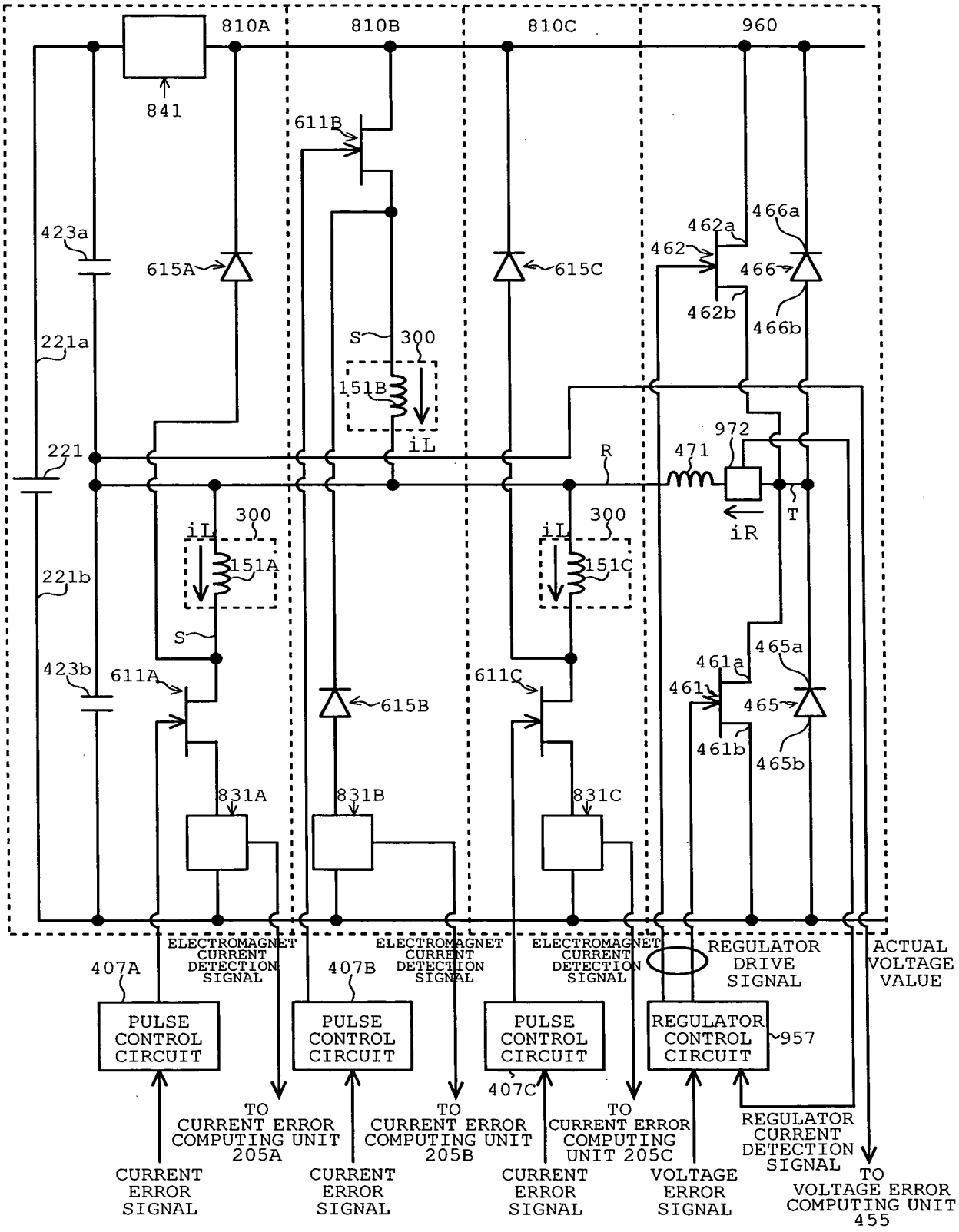
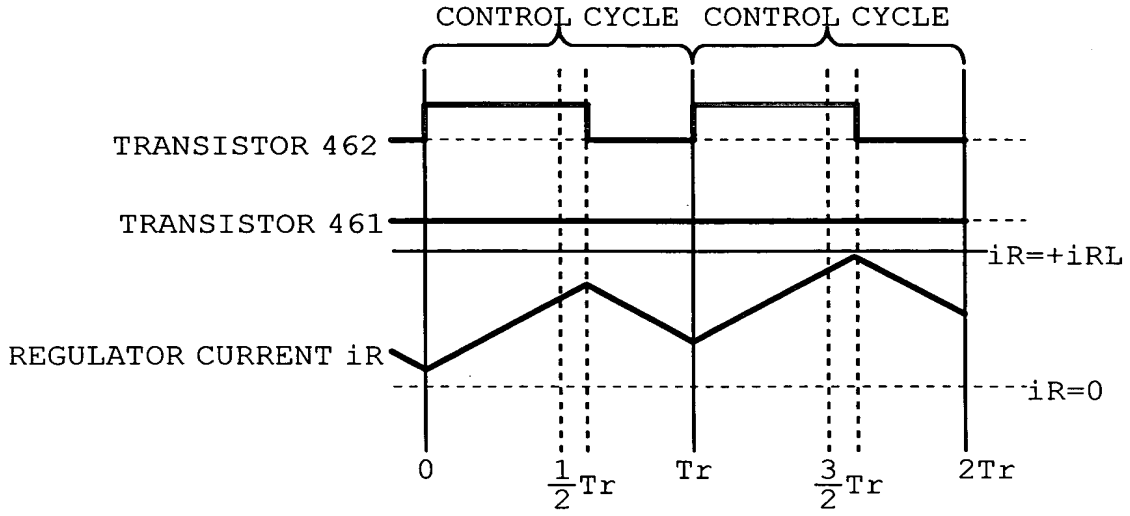

810A
810B
810C
960
841
611B
423a
615A
615C
462a
462
466a
466
462b
466b
221a
S
300
151B
iL
221
R
471
972
T
iR
iL
300
151A
151C
221b
S
423b
611A
615B
611C
461a
461
465a
465
461b
465b
831A
831B
831C
ELECTROMAGNET CURRENT DETECTION SIGNAL
ELECTROMAGNET CURRENT DETECTION SIGNAL
ELECTROMAGNET CURRENT DETECTION SIGNAL
REGULATOR DRIVE SIGNAL
ACTUAL VOLTAGE VALUE
407A
407B
407C
PULSE CONTROL CIRCUIT
PULSE CONTROL CIRCUIT
PULSE CONTROL CIRCUIT
REGULATOR CONTROL CIRCUIT
957
TO CURRENT ERROR COMPUTING UNIT 205A
TO CURRENT ERROR COMPUTING UNIT 205B
TO CURRENT ERROR COMPUTING UNIT 205C
REGULATOR CURRENT DETECTION SIGNAL
CURRENT ERROR SIGNAL
CURRENT ERROR SIGNAL
CURRENT ERROR SIGNAL
VOLTAGE ERROR SIGNAL
TO VOLTAGE ERROR COMPUTING UNIT 455

FIG. 12

WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS CONSIDERABLY
LOWER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR LARGE



WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS SLIGHTLY
LOWER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR SMALL

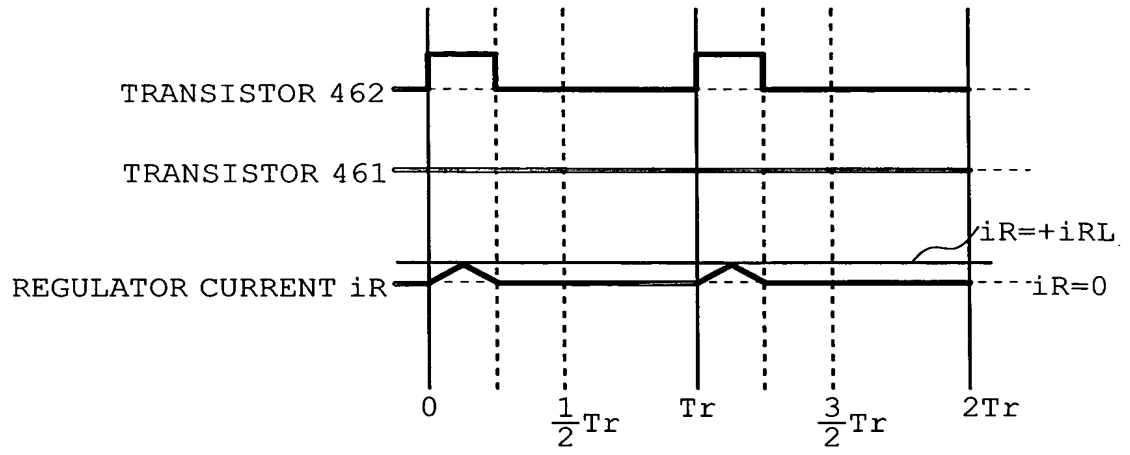
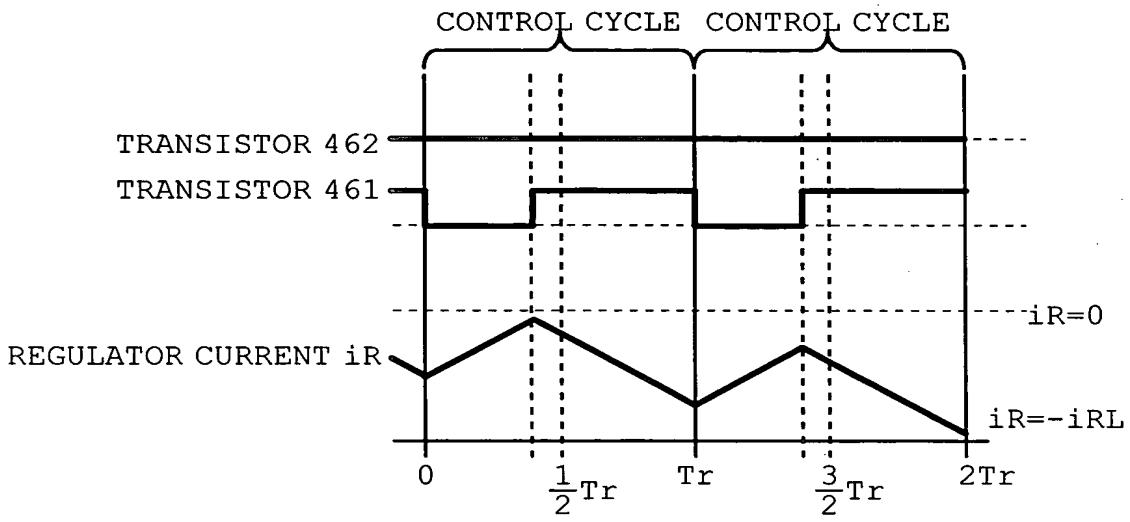


FIG. 13

WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS CONSIDERABLY
HIGHER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR LARGE



WHEN
ACTUAL VOLTAGE VALUE OF COMMON NODE R IS SLIGHTLY
HIGHER THAN VOLTAGE COMMAND VALUE MAKING THE VOLTAGE ERROR SMALL

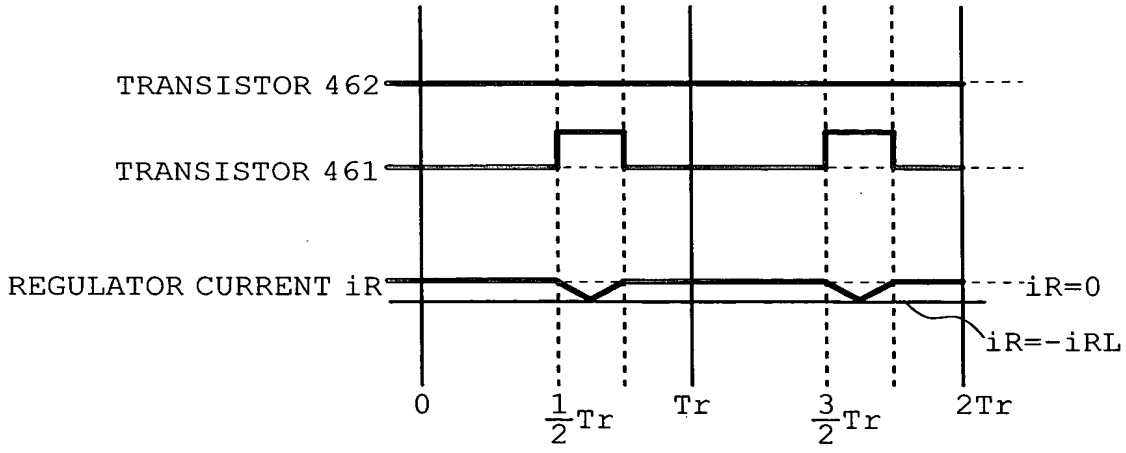


FIG. 14

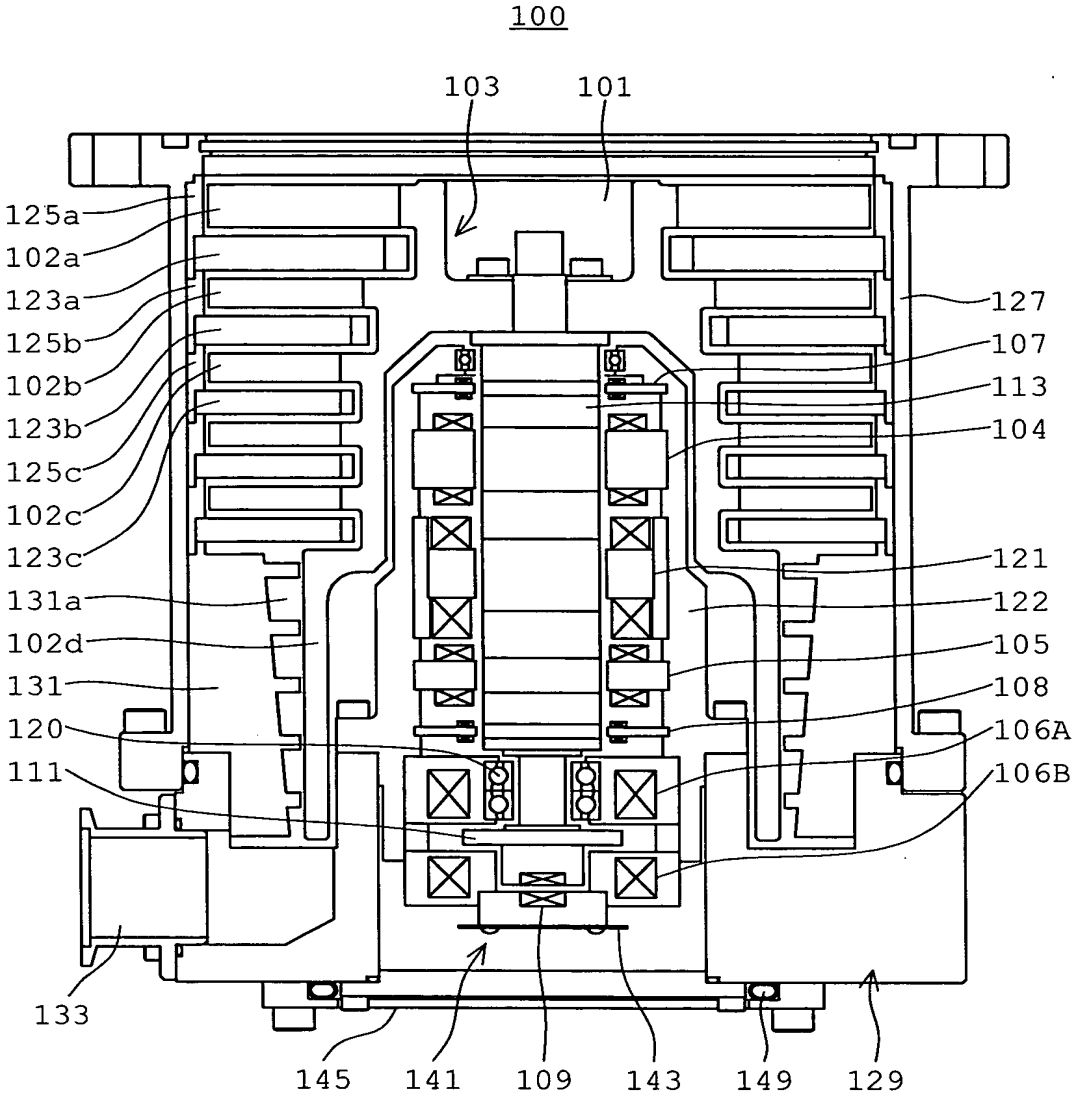

100
103
101
125a
102a
123a
125b
102b
123b
125c
102c
123c
131a
102d
131
120
111
133
145
141
109
143
149
129
127
107
113
104
121
122
105
108
106A
106B

FIG. 15
PRIOR ART

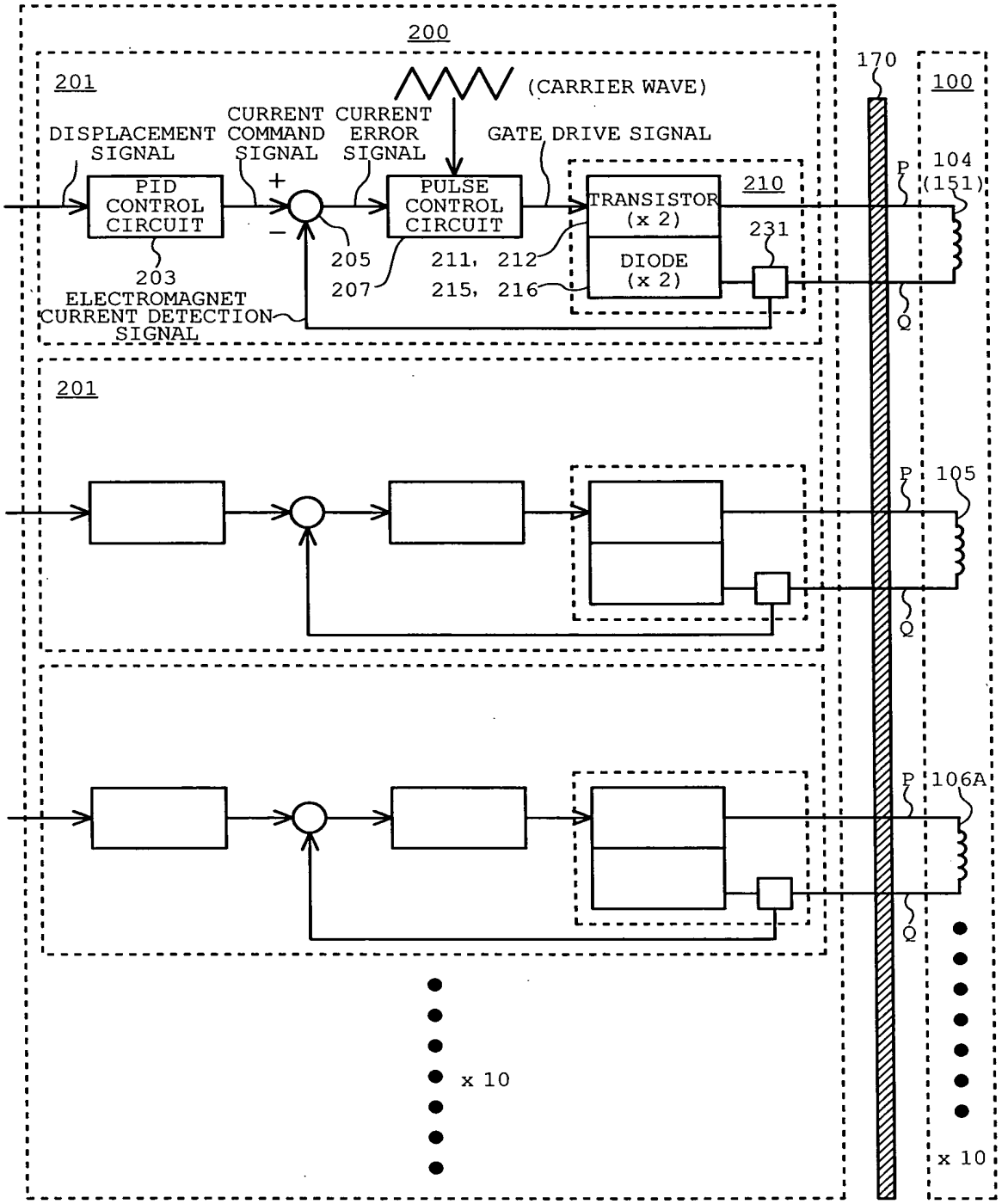


FIG. 16
PRIOR ART

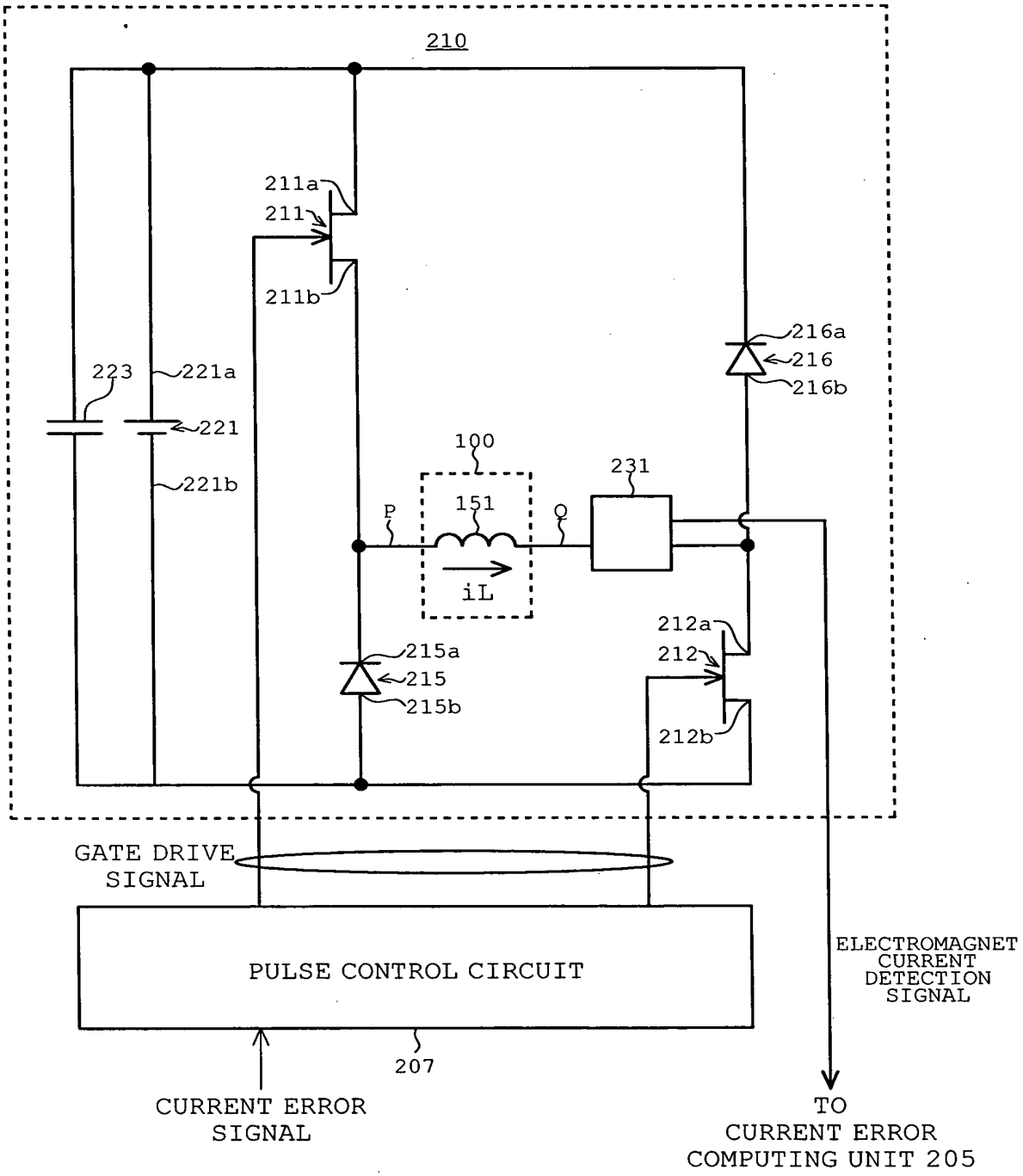


FIG. 17
PRIOR ART